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This instrument designed to evaluate trade and industrial education laboratories was developed to implement the Vocational Education Act of 1963 related to the evaluation of facilities. An alternative suggestion for the use of the instrument is as a guide for facility planning. The format of the data sheets of the instrument enables it to be used as a checklist for categories of school site, building plot, building space, equipment, construction details, lighting, heat, plumbing, electrical and color. A bibliography is included. (HH)

DEVELOPMENT OF CRITERIA FOR A VOCATIONAL-INDUSTRIAL EDUCATION LABORATORY EVALUATION GUIDE

by

Donald Hugh Martin

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IOWA STATE UNIVERSITY
of Science and Technology

Ames, Iowa

1967

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DEVELOPMENT OF CRITERIA FOR A VOCATIONAL-INDUSTRIAL EDUCATION LABORATORY EVALUATION GUIDE

by

Donald Hugh Martin

Summary of a Field Study Submitted to the
Graduate Faculty in Partial Fulfillment of
The Requirement for the Degree of
MASTER OF EDUCATION

Major Subject: Industrial Education

ED025110

Under the direction of
Prof. Lowell L. Carver, Chairman
Industrial Education Curriculum

Conducted under a grant from
Iowa Department of Public Instruction
Division of Vocational Education

Iowa State University
of Science and Technology
Ames, Iowa

1967

PROJECT SUMMARY

The purpose of this study was to design an instrument which could be used to evaluate trade and industrial education laboratories and shops in the area vocational technical schools in the State of Iowa.

The following specific objectives served to direct the study:

1. To establish criteria whereby trade and industrial education laboratories may be evaluated in accordance with the Vocational Education Act of 1963.
2. To develop a list of items that might be used in the evaluation of vocational industrial education laboratories.
3. To determine the value of each item by submitting the list to a group of specialists for their judgment.
4. To design an evaluation instrument that can be used for evaluating vocational industrial education laboratories.

Extensive searching of past research, professional journals, textbooks and construction guidelines resulted in the compiling of an instrument containing 142 separate items relating to facilities. Written responses received, as a result of mailing the original instrument to vocational technical educators, and verbal responses received as a result of personal visitations with several Iowa vocational technical educators, led to the development of the final evaluation instrument.

This instrument is designed to implement that part of the Vocational Education Act of 1963 related to evaluation of facilities.

The author believes the guide could also be readily adapted for facility planning. For example, the instrument might be used as a check list in planning a new facility.

VOCATIONAL INDUSTRIAL EDUCATION LABORATORY
EVALUATION GUIDE

Check one (1) box for each item.

1--Does not apply
2--Unsatisfactory
3--Satisfactory
4--Superior

	1	2	3	4
I. School Site				
1. The location is satisfactory in relation to prospective students.				
2. The environment is conducive to quality education.				
3. The site is easily accessible by public transportation.				
4. The site is easily accessible by private means.				
II. Building Plot				
1. The plot is large enough to allow for future expansion of the physical plant.				
2. The plot allows for expanded parking facilities as the enrollment increases.				
3. The plot allows for adequate student, faculty and visitor parking.				
4. The plot allows for safe traffic control.				
5. The plot allows for adequate and convenient delivery and unloading services.				
6. The plot provides for equipment storage areas that are shielded from view.				
7. Utilities are readily available.				
8. The plot has an elevation and contour that will insure good drainage.				

1--Does not apply
2--Unsatisfactory
3--Satisfactory
4--Superior

1	2	3	4

III. Building Space

1. The laboratory module has a potential open space of not less than 4800 square feet.

2. The length to width ratio of the laboratory is less than 2:1.

3. The minimum ceiling height is 12 feet.

4. Each laboratory provides for:

   (a) tool storage.

   (b) washing and toilet facilities.

   (c) work in progress storage.

   (d) office space.

   (e) material storage for everyday use.

   (f) related instruction space.

   (g) reference material space.

   (h) drinking water cooler.

   (i) minimum of one large service door.

   (j) minimum of one exit door at least 36 inches wide.

   (k) chalkboard area.

   (l) tackboard area.

   (m) planning center.

   (n) wardrobe area.

   (o) audio-visual tilted screen.

1--Does not apply
2--Unsatisfactory
3--Satisfactory
4--Superior

1	2	3	4

5. The laboratory has maximum flexibility to allow for changing size as program needs change.

IV. Auxiliary Spaces

1. Specialized storage areas are provided.
2. Locker space is readily accessible to each laboratory or shop.
3. Janitorial facilities are provided in each wing or cluster.
4. Audio-visual equipment is stored in a centralized area, easily accessible to the instructor.
5. Material receiving rooms are provided in each wing or cluster.
6. Waste disposal facilities are provided in each laboratory or classroom.
7. Lighted exhibit and display cases are provided.

V. Equipment

1. Equipment and tools are readily accessible.
2. Equipment is placed to permit safe mobility of students.
3. Equipment is placed for safe operation.
4. Equipment is placed to permit free flow of materials to and from work stations.
5. Equipment commonly used in sequential order is placed in the order of use with a minimum of travel between items.

1--Does not apply
2--Unsatisfactory
3--Satisfactory
4--Superior

	1	2	3	4
6.				
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6. Equipment is adequate for class size.

7. Equipment is representative of that used in industry.

8. Equipment used for cutting stock to work size is located near the stock storage room.

9. Equipment and tools are located to permit supervision by the instructor at all times.

10. The most hazardous machines and work stations are placed away from primary traffic lanes.

11. Equipment is wired through a master control switch which is adequately identified.

12. Each machine is equipped with a start-stop magnetic switch for independent control.

13. Switches are located within easy emergency reach of the operator.

14. Low voltage controls are used for high voltage equipment.

15. A clear space of 4 to 6 feet is provided in front of tool panels and entrances to tool rooms.

16. Primary traffic lanes are no less than 4 feet wide.

17. Secondary traffic lanes are no less than 3 feet wide.

18. Machines are located away from pipes and columns to eliminate noise transfer.

19. Equipment is mounted on vibration free pads to eliminate sound transmission through floors.

1--Does not apply
2--Unsatisfactory
3--Satisfactory
4--Superior

	1	2	3	4
20.	An equipment safety check list is used periodically.				
21.	Provisions are made for orderly maintenance of all equipment.				
22.	Hazardous equipment is equipped with adequate guards and surrounded by guard rails appropriately color coded.				
23.	Safety zones are marked on the floor around each machine.				
24.	All machines are equipped with appropriate safety devices.				
25.	Tools used frequently in one area are removed from centralized storage and are stored near the place of use.				
26.	Provisions are made for plant maintenance.				

VI. Construction Details

1.	The walls are constructed of or treated with materials that permit easy maintenance.				
2.	Floors are constructed of materials in keeping with the demands of the trades involved.				
3.	Accoustical treatment is employed to minimize sound transmission in and between rooms.				
4.	Laboratories and classrooms are, where possible, constructed without columns or structural protrudances.				
5.	Ceilings are constructed of a light colored, sound absorbent, easy-to-maintain material.				

1--Does not apply
2--Unsatisfactory
3--Satisfactory
4--Superior

VII. Lighting

	1	2	3	4
1. Window area in the laboratory or classroom is less than 10% of the total wall area.				
2. Natural light controls are provided.				
3. Artificial light source provided is fluorescent except in electronics laboratories where a balanced fluorescent/incandescent system may be used.				
4. The general lighting system utilizes semidirect lighting.				
5. Light reflection values of ceilings are between 80% and 90%.				
6. Light reflection values of wall surfaces are between 50% and 70%.				
7. Light reflection values of wainscoating materials are between 30% and 50%.				
8. Light reflection value of machinery is between 30% and 50%.				
9. Light reflection value of chalkboards is between 15% and 25%.				
10. Light reflection value of floors is between 20% and 30%.				
11. General illumination level throughout the facility is a minimum of 75 foot candles.				
12. High intensity light is provided at all points of operation of equipment.				

1--Does not apply
2--Unsatisfactory
3--Satisfactory
4--Superior

VIII. Thermal Environment

	1	2	3	4
1. A minimum temperature of 70°F. can be maintained in each laboratory during cold weather.				
2. Classroom temperatures can be maintained at 70-74°F. during cold weather.				
3. Mechanical cooling can maintain a 15°F. differential between inside and outside temperature during warm weather.				
4. Humidity can be controlled to maintain a comfortable level year round (25-60%).				
5. Controllable exhaust systems for the removal of air contaminants are in use where practicable.				
6. Air velocity does not exceed 45 feet per minute when it is being circulated.				
7. If a central plant is used, provisions are made for economical expansion.				

IX. Plumbing

1. Adequate drinking fountains are provided.				
2. Washing facilities are provided for at a maximum ratio of one station per 10 students.				
3. Air compressors are located outside of the laboratories.				
4. Hot and cold water are provided where needed.				
5. Compressed air outlets are provided at 20 foot intervals in areas where needed.				

1--Does not apply
2--Unsatisfactory
3--Satisfactory
4--Superior

	1	2	3	4
6.				
7.				
8.				
9.				

X. Electrical

	1	2	3	4
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3.				
4.				
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7.				
8.				
9.				

1--Does not apply
2--Unsatisfactory
3--Satisfactory
4--Superior

10. Explosion proof switches, lights and motors are used in finishing areas.

11. Strategically located remote control switches for all electricity connected to machine tools and convenience outlets are provided.

12. All parts of the electrical system are conveniently located for servicing.

13. All parts of the electrical system are planned to permit easy and economical expansion.

XI. Color Dynamics

1. Equipment is painted a uniform, light color.

2. Safety shields and controls are painted orange.

3. Stumbling hazards or stationary hazards are painted in yellow and black stripes.

4. Electrical switches have black on and red off buttons.

5. Exposed parts, such as pulleys, gears and cutting devices are painted orange.

6. Fire combatting devices are painted red.

7. First aid equipment is marked green with white crosses.

8. Aisle markings are used.

9. Ceilings are colored in a flat white or other high reflectance value.

10. High walls are light in color such as white, cream or ivory.

1--Does not apply
2--Unsatisfactory
3--Satisfactory
4--Superior

	1	2	3	4
11.	Inside surfaces of switch boxes are painted orange.				
12.	Blue tags are provided for denoting machinery out of order.				
13.	Any overhead moving objects are painted yellow.				

XII. Miscellaneous

1.	Fire extinguishing agents are in adequate supply.				
2.	Proper type of fire extinguishing agents are properly located in each room.				
3.	First aid cabinets are adequately stocked.				
4.	Adequate provisions are made to safely handle waste materials and combustibles.				
5.	Exterior storage areas are protected with an adequate fence and locked gates.				
6.	Outside storage is provided for inflammables.				
7.	Telephone service is provided in each laboratory.				
8.	A master clock system is in use.				
9.	Television outlets are provided for closed circuit television.				
10.	An intercom system is in use.				
11.	A sprinkler system is employed for fire protection.				
12.	All stair doors open toward an exit.				

1--Does not apply
2--Unsatisfactory
3--Satisfactory
4--Superior

	1	2	3	4
13.	All doors are equal to Class B as defined by Underwriters' Laboratories.			
14.	Separate toilet facilities are provided for both sexes.			
15.	Main hallways are not less than 8 feet and 6 inches wide.			
16.	Secondary hallways are not less than 7 feet wide.			
17.	There are not projections in excess of 8 inches in the hallways.			
18.	In multistory buildings at least two stairways remote from each other are in use.			

COMMENTS:

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